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NCRP 50th Annual Meeting Achievements of the Past 50 Years and Addressing the Needs of the Future

R.E. Toohey, PhD, CHP

National Council on Radiation Protection and Measurements (NCRP) President John D. Boice, Jr., welcomed 280 attendees to the NCRP 50th Annual Meeting "Achievements of the Past 50 Years and Addressing the Needs of the Future," held in Bethesda, Maryland, 10–11 March 2014.

NCRP President John Boice, left, with NCRP Senior Vice President Jerrold Bushberg

NCRP Senior Vice President Jerrold T. Bushberg, University of California, Davis, opened the meeting with his Warren K. Sinclair keynote address, "Science, Radiation Protection and the NCRP: Building on the Past, Looking to the Future." Bushberg reminded attendees that Sinclair was well known for his strongly held scientific positions and that the ancient Irish prayer "Lord, grant that I may always be right, for thou knowest I am a hard man to turn" befitted him. His scientific contributions indicate the Lord heard the prayer.

Bushberg said the NCRP is chartered by Congress to address the radiation protection needs of the nation and its objective is to collect, analyze, develop, and disseminate information and recommendations in the public interest. He said NCRP has accomplished this mission through over 200 reports, commentaries, and statements, as well as the proceedings of its annual meetings.

Figure 1: Boiceinium-211m

With regard to the present, Bushberg commented that if President Boice were a radionuclide, he would be boiceinium-211m (Figure 1), which emits energy for long periods, has multiple energy emissions, and has long-range effects. Boice's efforts to promote awareness of the NCRP include "The Boice Report" in *Health Physics News* and frequent presentations to government agencies and decision makers on how the NCRP can help them. New NCRP initiatives focus on improved public communication and include an enhanced web presence and use of social media.

Bushberg concluded that many unresolved questions do remain, and NCRP is a unique and valuable resource that will continue to provide guidance on best practices for uses of radiation in modern society.

The scientific sessions of the meeting were organized around the seven NCRP Program Area Committees (PACs), beginning with PAC 1: Basic Criteria, Epidemiology, Radiobiology, and Risk.

Kathryn Held

The first session of the meeting was chaired by Kathryn Held, Massachusetts General Hospital.

R. Julian Preston

R. Julian Preston, Environmental Protection Agency (retired), spoke on a report that is currently under preparation, "Integrating Basic Radiobiological Science and Epidemiological Studies (Why and How?)." He reviewed the recent attention by national and international committees and organizations on the incorporation of basic radiation biology data into radiation risk estimates to reduce uncertainty. Large uncertainties exist in the epidemiologic data, especially the Japanese atomic-bomb survivors. He pointed out that uncertainties in risk estimates arise from dosimetry, methodological issues, low statistical power and precision, inadequate modeling, transport of risk estimates across populations, models used for extrapolation, the DDREF (dose and dose rate effectiveness factor) value, and the quality factor for high linear energy transfer (LET) radiation effects. This uncertainty can be reduced if individual doses are well characterized, but that approach is limited in application; greater use needs to be made of radiobiological data from laboratory animal and cellular studies, and a biologically based dose-response (BBDR) model should be developed. He discussed the limited use of radiobiological data in risk assessment. He concluded by pointing out that we need to identify radiation signatures of response, if they exist; develop adverse outcome pathways; identify and evaluate key events/bioindicators; develop new and improved BBDR models; and do epidemiological studies directed at low-dose and low-dose-rate exposures.

Francis A. Cucinotta

Francis A. Cucinotta, University of Nevada Las Vegas and former scientist at the National Aeronautics and Space Administration (NASA), presented "Radiation Safety and Human Spaceflight: Importance of the NCRP Advisory Role in Protecting Against Large Uncertainties." He said the NASA space cancer risk model, developed in the 1970s, used dose limits suggested by the National Research Council and assumed that the risks of leukemia and solid cancers were equal and that the doubling dose for 35-year-old males was 4 Sv. By the 1980s, both female astronauts and career astronauts were flying, the reassessment of the Japanese atomic-bomb survivor doses was published, and the radiobiology of high-atomic-number and high-energy particles was being studied. In 1989, NCRP suggested using a 3 percent increase for an "acceptable" fatal cancer risk. NASA was considered a "less-safe" industry and used gender-based dose limits. NCRP Report 132 maintained the 3 percent limit, but in the meantime other "less safe" industries came down to a 1 percent occupational risk level. NASA estimates the current "loss of crew" risk to be 1 in 270; so, Cucinotta asked, is a radiological risk limit of 1 in 33 comparable? He spoke about the highly uncertain risk estimates for the space environment and asked whether the acceptable risk should include cardiovascular and central nervous system morbidity. Other questions being asked are whether acute risk to memory and cognition impact mission success and whether vision would be impaired over a long (three-year) mission due to damage to the lens of the eye.

Steve Simon

Steve Simon, National Cancer Institute, presented "Biological Effectiveness of Photons and Electrons as a Function of Energy." He said an unresolved question in evaluating the cancer risk in humans from exposure to low-LET radiation (i.e., photons and electrons) is the dependence of the biological effectiveness on energy. A report under development by Scientific Committee (SC) 1-20 requires expertise in half a dozen areas; the committee used education and cross-fertilization by related disciplines to approach this question. The quantity of interest is not exactly the same old modifying factor, nor the relative biological effectiveness (RBE), nor the radiation weighting factor, w_R. This study is instead a quantitative assessment of uncertainties to be described by subjective probability distribution functions (PDFs) and represents expert judgment about the current state of knowledge. There are five threads of scientific evidence to pursue: microdosimetric calculations, DNA damage, radiobiological cell stud-

ies, radiobiological animal studies, and human epidemiological studies. The approach is to collect and review data for each thread, establish their relevance, develop a PDF for each thread, and then combine the threads and use Bayesian methods and expert elicitation. The challenge is the lack of definitive evidence from any one thread, according to Simon.


John W. Poston

The second session focused on "Nuclear and Radiological Security and Safety," a joint effort of PACs 3 and 5, cochaired by John W. Poston, Texas A&M University, and Jill Lipoti, New Jersey Department of Environmental Protection (retired).


C. Norman Coleman

C. Norman Coleman, National Cancer Institute, presented "Response to an Improvised Nuclear Device or a Radiological Dispersal Device: Models, Measurements, and Medical Care." He described progress since 2004 in national planning for two scenarios: detonation of a radiological dispersal device or of a 10-kT improvised nuclear device. He said current focus has shifted from first response to obligations to society, including public health and public communications. The medical response algorithm is a complex system with many interrelated parts; the problem is translating science into guidance for the conduct of operations. Coleman talked about the need to optimize triage and treatment decisions, analyzing the need and effectiveness of treatment, and the standards of care. He pointed out that treating those with moderate injury first maximizes the number of survivors; however, rapid dosimetry methods are not widely available. The lymphocyte count is most available, but not rapid; electron paramagnetic resonance on tooth enamel may be the quickest available biodosimetry postexposure. He emphasized that there is a need to integrate medical triage with a coordinated biodosimetry model. To establish a national conduct of operations model, the experience at the U.S. Embassy in Tokyo immediately following the Fukushima Daiichi nuclear power station accident led to a revised medical decision-making model: decision making must occur on site and responding agencies should issue preliminary guidance from on-site experts, with more guidance to follow later. Coleman said that a balanced portfolio is needed and that the NCRP is a valued nongovernment expert partner. Improvement of the model continues with lessons learned from chemical incident response to provide science-based content and processes with continuous review and improvement.


S.-Y. Chen

S.-Y. Chen, Illinois Institute of Technology, presented "Decision Making for Late-Phase Recovery From Nuclear or Radiological Incidents (What's Next After the First Responders Have Left?)." He stated that SC 5-1 has completed work on NCRP Report 175, "Nuclear and Radiological Security and Safety," which is close to publication. One of the lessons learned from the Top Officials 2 exercise was: "OK, we got the incident under control; now what do we do?" Report 175, he said, provides a basic framework for and approaches to implementing and optimizing decision making during the late-stage recovery for large-scale radiological or nuclear incidents. The initial charge to the committee was for terrorist incidents, but the Fukushima Daiichi accident changed things dramatically, so the report was expanded to cover nuclear power plant accidents. Because of active stakeholder outreach and engagement, communication methods and strategies become most important; there will be many stakeholder groups, probably with conflicting goals. A plan must also be developed for long-term monitoring and residual impact management for both residents and ecosystems. Site-specific optimization requires a flexible, adaptive, and iterative approach that must focus on community, be a long-term process, and use experience from prior incidents.


Carol D. Berger


Ruth E. McBurney

Session 3, a joint operation of PACs 2 and 5, "Operational and Environmental Radiation Protection," was chaired by Carol Berger, Integrated Environmental Management, Inc., and Ruth McBurney, Conference of Radiation Control Program Directors.


Kathryn H. Pryor

Kathryn H. Pryor, Pacific Northwest National Laboratory, discussed the development of the NCRP report, "Radiation Safety of Sealed Radioactive Sources." She asked "What is a sealed source?" and then explained that it may range from teletherapy to industrial radiography to well-logging to ordinary check sources. Although definitions vary among regulators and standards organizations, a common element is that the source is sealed, encapsulated, or otherwise fixed under conditions of intended use. There are, however, large differences in the degree of "sealing" and environmental and usage conditions. Sources can cause problems if lost, stolen, or damaged. Leakage or failure can spread contamination and sources can be diverted to terrorist use, so that even small sources can cause big problems. Pryor gave an example of a situation where a "sealed" 144 MBq electrodeposited ^{238}Pu source contaminated three workers, two adults, one child, two buildings, items in two homes, and three personal vehicles. In this case, temperature recycling to -40 ^{0}C cracked a "superglue" barrier. Pryor pointed out that the NCRP report will provide cradle-to-grave recommendations on sealed-source use in different occupational settings.


David J. Allard

David J. Allard, Pennsylvania Department of Environmental Protection, presented an overview of "Pennsylvania's Technologically Enhanced Naturally Occurring Radioactive Material Experiences and Studies of the Oil and Gas Industry." Technologically enhanced naturally occurring radioactive material (TENORM) is not subject to regulation under the Atomic Energy Act; it consists primarily of uranium, thorium, their progeny, and ^{40}K. However, the Occupational Safety and Health Administration and Department of Transportation regulations do govern some aspects of TENORM, so regulatory control falls to the states. Allard gave examples of situations in Pennsylvania involving TENORM. Allard stated Pennsylvania probably has the highest indoor ^{222}Rn levels in the United States. He also discussed the use in the state of unconventional wells such as those used for "fracking," especially in the Marcellus Shale formation. In this case, the TENORM is mostly ^{226}Ra. Issues include impacts on surface water supplies and water treatment facilities. Pennsylvania is performing a cradle-to-grave study of the process from drilling to distribution and is also looking at environmental levels of TENORM around gas-fired electrical plants and in filter cake from production water treatment.


Mark D. Hoover

Mark D. Hoover, National Institute for Occupational Safety and Health, spoke on the report "Radiation Safety in Nanotechnology (Does Size Matter?)," which is being developed to provide guidance on radiation safety programs that deal with 1- to 100-nm-diameter particles. The committee is taking an informatics approach, which requires that leaders, cultures, and systems must be built and sustained; flaws in decision making (including lack of concise, logical, ethical, accurate, and relevant [CLEAR] objectives) must be avoided; and communications must also be CLEAR. In addition, the committee is looking at relevance and reliability, "know versus show" alignment, perception versus reality, lessons learned, paths forward, and risk management at the confluence of public health and emerging technology. Hoover said the report will provide practical operational information using the informatics approach to determine which information meets the objectives of the community, to develop and implement collection and evaluation methods, and to confirm that appropriate decisions are made based on the information. He emphasized that better characterization of particles will lead to better dosimetry.


Wesley E. Bolch

The final technical session of the day was conducted by PAC 6, "Radiation Measurements and Dosimetry," and was chaired by Wesley E. Bolch, University of Florida.

Raymond A. Guilmette, Lovelace Respiratory Research Institute, presented "Framework and Need for Dosimetry and Measurements: Quantitation Matters." He reminded listeners that dosimetry and measurements are key components of radiation protection programs and said that NCRP reports on these topics


Raymond A. Guilmette

began with NCRP Report 8 on dose measurements for x rays. Dosimetry covers population exposures, microdosimetry, nonionizing radiation, biokinetics, dosimetric models, uncertainty, and x- and gamma-beam dosimetry. Guilmette gave background on the relationship between the NCRP and the International Commission on Radiological Protection (ICRP) and the dosimetry models developed by each group. He added that four NCRP reports (158, 163, 164, and 171) support dose-reconstruction programs for atomic veterans and energy employees and that four reports are currently in progress on low-LET RBE, nanotechnology, dose reconstruction for the Million Worker Epidemiological Study, and a dose assessment review for Operation Tomodachi. A major initiative is to develop a scientifically based regulatory framework for early-phase radiation biodosimetry to provide rapid diagnostic information for medical response to a radiation mass-casualty incident.

Additional projects include publications related to biodosimetry and biomarkers, practical methods for population dose assessment, an update of NCRP Report 58, and exploring emerging issues in measurements and dosimetry related to medical diagnosis and treatment.


Andre Bouville

Andre Bouville, National Cancer Institute (retired), presented "Dose Reconstruction for the Million Worker Epidemiological Study." The report being prepared includes an extensive uncertainty analysis, and although it uses the same input data as compensation programs, it has a very different endpoint. The committee has 20 members, including 18 dosimetrists, a biostatistician, and a part-time epidemiologist. Cancers studied include leukemia, thyroid cancer, and male/female breast cancer. Cardiovascular, cerebrovascular, and other diseases may be included. He said that the committee has completed dose assessments for workers at two nuclear-weapons facilities; is working on dose assessments for atomic veterans, nuclear power plant workers, and industrial radiographers; and is beginning studies of medical workers. He said it is important to note that the Million Worker cohort had diverse exposure scenarios over 70 years, had more doses above 50 mSv than the atomic-bomb survivors, and were essentially all protracted exposures. Bouville said that it is expected that the committee will provide its report in 2016.


Jerrold Bushberg, left, and Fred A. Mettler, Jr.

President Boice welcomed attendees to the 38th Lauriston S. Taylor Lecture. This year's lecturer, Fred A. Mettler, Jr., New Mexico Federal Regional Medical Center, was introduced by Jerrold Bushberg. Bushberg recalled many interactions through the years with Mettler and presented a brief summary of the speaker's accomplishments. Mettler joined the University of New Mexico in 1978 and became professor and chair of radiology in 1985. He has over 360 publications in the open literature and has written 20 books.

In "On the Shoulders of Giants: Radiation Protection Over 50 Years," Mettler said that this was a scary lecture to give, putting 50 years into 50 minutes. He remembered that Taylor was a superb gentleman and a great woodworker and had a 50-year career. With regard to giants, Mettler noted that the saying "If I have seen farther it is because I was standing on the shoulders of giants" can be traced back to Bernard of Chartres in the 12th century. He listed the many giants who influenced him personally and then went on to reflect on over 50 years of radiation protection.


Donald L. Miller

Mettler continued with a long and impressive list of former and current giants of radiation protection and shared photos and anecdotes of many present in the audience. Mettler concluded his presentation by saying that there are also giants who keep others in giant status and recognized the NCRP staff.

The second day of the meeting began with PAC 4's session, "Radiation Protection in Medicine," chaired by Donald L. Miller, U.S. Food and Drug Administration.

Kimberly E. Applegate

Kimberly E. Applegate, Emory University School of Medicine, presented "Protection of Patients in Diagnostic and Interventional Medical Imaging." She said issues in this area include building a safety culture, lack of radiation protection knowledge among practitioners, silos of knowledge, and lifelong learning. Some effective solutions have included the Image Gently, Image Wisely, Step Lightly, and Choosing Wisely campaigns, but the radiation safety officer's job remains primarily herding cats. There are 3.6 billion radiological examinations per year and the growth curve is identical around the world. Safety is the avoidance of unnecessary risk and the minimization of necessary risk. Creating safety culture in health care can be facilitated by decreasing authority gradients and using checklists and audits, structured language, team briefings and debriefings, lifelong learning, and periodic assessments. Key attributes of safety culture include redoubled efforts to enhance quality, elicit and honor patient preferences, rely on systems engineering and operations research, learn from peers, and improve accountability. Applegate concluded that we need to ask for help from our members, look at the structure of the health care system for radiation safety culture, define the processes, create up-to-date policy and procedures, have available equipment and reachable expertise, and establish documentation and performance metrics.

Steven Sutlief

Steven Sutlief, University of Washington Medical Center, presented "Protection and Measurement in Radiation Therapy." He reviewed accomplishments in radiation therapy beginning in 1896 with the treatment of a breast-cancer patient with x rays and continuing to the present. Sutlief said that from its inception NCRP has contributed much to the field of radiation protection by promoting goals to optimize conformality, targeting, fractionation, and adjuvant therapy and by promoting the radiation protection fundamentals of justification, optimization, and limitation. He said that the future will bring new technologies, molecular-based treatment planning, and more regulatory oversight. He added that while the conformity of radiation dose continues to undergo incremental refinements, greater gains may be made by assessing patient-specific radiation biology for the purpose of patient selection, so that radiation is given only to those patients likely to benefit from it.

Robert L. Brent

Robert L. Brent, Alfred I. DuPont Institute Hospital for Children, presented "Protection of the Gametes and Embryo/Fetus From Ionizing Radiation Exposure." NCRP Report 174 on this topic is an update of NCRP Report 54 (1977). There is a section in the new report on mutagenesis, although it is not observed in humans; there is little-to-no evidence of mutagenesis among the children of childhood, adolescent, and young adulthood cancer survivors and the Japanese atomic-bomb survivors. He discussed the use of experimental animals to further this research and added that because of the rarity of persistence of induced mutations in humans it would require millions of people getting at least 2 Gy of prompt or 4 Gy of fractionated radiation to see a mutagenetic effect. Sixty years of animal research show no observed adverse effect at levels less than 0.2 Gy. For congenital malformations, growth retardation, miscarriage, and stillbirth, the effect appears to be all or nothing; the tissue reaction effects of mental retardation, neurobehavioral effects, and cancer risk in offspring are consistent with a threshold dose. Numerous studies of childhood cancer from in utero radiation have been performed: 24 of 40 case-control studies were not significant; however, a meta-analysis indicated a relative risk of 1.2 to 1.3 for childhood leukemia and cancer. He pointed out that a study of Japanese atomic-bomb survivors indicates that lifetime risk following in utero exposure may be considerably lower than lifetime risk from early childhood exposure. He emphasized the importance of communicating benefits and risks to women exposed to radiation during pregnancy.

Julie E.K. Timins

The final scientific session of the meeting was on PAC 7, "Radiation Education, Risk Communication, Outreach and Policy," and was chaired by Julie E.K. Timins, chair of the New Jersey Commission on Radiation Protection.


Paul A. Locke

Paul A. Locke, Johns Hopkins University, presented "Historical Trends in Radiation Protection, Policy and Communications: 1964 to the Present." He began with the early history of the NCRP and risk communication from 1964 to 1979. The risk communication model at that time was "if you knew what I knew, you would make the same (rational) decision that I make." That changed on 28 March 1979 at Three Mile Island. Risk communication was a top-down process and the attitude was that anyone could do effective risk communication; that attitude cost the nuclear power industry dearly. The National Research Council published on improving risk communications in 1989; it was defined as an interactive process for the exchange of information and opinion among individuals and organizations. The goals of PAC 7 are focused on the science of radiation risk communication, scholarship, and skills. The plan is to integrate communication up front in the report-writing process, for example, by ensuring the report is understandable by the intended audience. Finally, social media are a constantly changing landscape, and the committee plans to take advantage of the developing scholarship on their use.


Michael A. Boyd

Michael A. Boyd, Environmental Protection Agency (EPA), presented "U.S. Radiation Protection: Role of National and International Advisory Organizations and Opportunities for Collaboration (Harmony not Dissonance)." He began by saying that for many years close collaboration between the ICRP and the NCRP kept recommendations in harmony, but he pointed out that regulations have not kept up with these recommendations. He discussed how to go from science to regulations. He said we collect and interpret scientific literature (e.g., United Nations Scientific Committee on the Effects of Atomic Radiation and National Academy of Sciences Biological Effects of Ionizing Radiation reports), we develop radiation protection recommendations based on that science (NCRP and ICRP), and we update and use the Basic Safety Standards (International Atomic Energy Agency) or our national regulations in the United States. Nevertheless there is still a lag in implementing recommendations in regulations. He noted that the response to the Fukushima Daiichi nuclear power plant accident was complicated by the United States' dissonance with the global radiation protection community. Boyd noted that EPA has issued an advance notice of proposed rulemaking for the fuel cycle regulations in 40 CFR 190 and the Nuclear Regulatory Commission is preparing a technical basis for updating 10 CFR 20. In addition, United States agencies are collaborating with the Interagency Steering Committee on Radiation Standards subcommittees and are also participating in NCRP and ICRP efforts.


John D. Boice


Kenneth R. Kase

Boice opened the final session, "Summary: NCRP for the Future," and introduced Program Chair Kenneth R. Kase, who presented "Capturing Opportunities and Meeting Challenges in Radiation Protection." After reviewing NCRP's direction over the past few years, Kase said, as Mettler noted in his lecture, NCRP's future success will depend on the current group of giants and their ability to identify and train the next generation of giants. Kase reviewed the highlights of the meeting to identify the NCRP work needed. He said that it would be nice to see U.S. regulations based on ICRP Publication 103 and a revision of NCRP Report 116 before the ICRP issues its next set of guidance. At the 25th annual meeting in 1989, Warren Sinclair saw the NCRP role to lie in radiation research, sound application of principles, improved measurement and dosimetry techniques, public exposure (particularly medical doses), public understanding of radiation risk in the context of other hazards, accident prevention and preparedness, and recommendations for regulations to achieve adequate control. Many of these tasks have been accomplished, and the question now is, What is NCRP ready to address beyond ICRP 103?

One needed revision of the basic radiation protection recommendations is a rational and consistent specification of detriment: integrating stochastic and tissue effects; integrating effects of age at exposure, gender, and genetic susceptibility; and consideration of the severity and treatment of radiation effects and thresholds. The ethical principles for radiation

protection also need further elucidation. Challenges continue to arise, but there are opportunities in the strength of NCRP's resources and in collaboration with other national and international organizations.

Boice made concluding remarks and thanked the attendees for sharing in the celebration of NCRP's 50th annual meeting.

The presentations, questions, and responses will be posted soon on the NCRP website (ncrponline.org). The proceedings of the meeting will be published in *Health Physics* by the end of this year. The conference was video recorded by Thomas Johnson and Colorado State University students.

All NCRP meeting photos by Genevieve Roessler

NCRP Business Meeting: New Members Elected

Laura Atwell, NCRP Office Manager, Meeting Coordinator

The National Council on Radiation Protection and Measurements (NCRP) held its 50th Annual Business Meeting on 11 March, in conjunction with the 2014 NCRP Annual Meeting "NCRP: Achievements of the Past 50 Years and Addressing the Needs of the Future."

The newly elected members of the Council are Judith L. Bader (U.S. Department of Health and Human Services), Michael A. Boyd (U.S. Environmental Protection Agency), Joseph R. Dynlacht (Indiana University School of Medicine), Helen A. Grogan (Cascade Scientific, Inc.), Kathryn A. Higley (Oregon State University), Michael D. Story (University of Texas, Southwestern Medical Center at Dallas), and Cary Zeitlin (Southwest Research Institute). Members of the Council who were reelected to another six-year term are Jerrold T. Bushberg, Mary E. Clark, William F. Morgan, Stephen V. Musolino, Bruce A. Napier, Anthony J. Seibert, Robert C. Whitcomb, X. George Xu, and Craig R. Yoder.

Elected as distinguished emeritus members in recognition of their outstanding contributions to NCRP's scientific program were Paul M. DeLuca, John R. Frazier, Carl J. Paperiello, and Daniel J. Strom. Elected officers were President John D. Boice, Jr., Senior Vice President Jerrold T. Bushberg, and Secretary/Treasurer James R. Cassata. Elected to the Board of Directors were Jonine Berstein, James A. Brink, Lawrence Dauer, Donald P. Frush, Ruth E. McBurney, William F. Morgan, William E. Kennedy, Bruce A. Napier, Kathryn H. Pryor, Richard E. Toohey, and Gayle E. Woloschak. The president and senior vice president are automatically directors.

The Council consists of 100 elected members recognized as leaders in many scientific fields of relevance to radiation protection and measurements in medicine, homeland security, environmental protection, nuclear technology, and public and occupational radiation exposures. Information about NCRP is available online at NCRPonline.org. For additional information contact NCRP Executive Director James R. Cassata at cassata@NCRPonline.org, 301-657-2652 (x20), or 301-907-8768 (fax).

Call for Nominations for HPS Officers and Board

Ken Groves, HPS Fellow, Nominating Committee Chair

The deadline is approaching to submit your nominations for Health Physics Society officers. This year we are looking for nominations for President-elect, Treasurer-elect, and Board of Directors.

Send your nominations by **1 May 2014** to Nominating Committee Chair Ken Groves directly via email: sevorgservices@yahoo.com.

More information on the nomination process can be found at https://hps.org/memberonly/operations/officernomination.html.